SEMESTER END EXAMINATION APRIL-MAY, 2026

Course Name: - B.TECH. Hons.(CSE with AI&FM) **Semester:- IV**

Paper Name: - OPERATING SYSTEM **Paper Code:- NAM-403**

Time - 3 Hrs + 20 minutes per hour extra time for V.I. & examinees with writer. **Max Marks-70**

Instructions:

- The question paper consists of three sections namely A, B, C. All sections are compulsory.
- Section A- Each question carries **3 mark. All questions are compulsory**.
- Section B- Answer any **5 out of 7** given questions. Each question carries **7 marks**.
- Section C- Answer any **2 out of 3** given questions. Each question carries **10 marks**.

Section - A
Multiple Choice Questions

1. Answer all the following questions. **5x3 =15**

i) Turnaround time =

A) Completion time – Arrival time

B) Waiting time + Burst time

C) Both A and B

D) Response time

ii) Deadlock necessary condition:

A) Mutual exclusion

B) Hold and wait

C) Circular wait

D) All of the above

iii) FIFO page replacement suffers from:

A) Belady's anomaly

B) Deadlock

C) Starvation

D) Fragmentation

iv) In a file system, which allocation method allows direct access to any block without traversing others?

A) Contiguous allocation

B) Linked allocation

C) Indexed allocation

D) Both a and c

v) Which paging hardware component maps virtual addresses to physical addresses?

A) TLB (Translation Lookaside Buffer)

B) Page table base register

C Memory Management Unit (MMU)

D) Cache controller

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Section – B
Short Answer Questions

2. Answer any five of the following questions. **5x7=35**

i) Differentiate between TRASHING and VIRTUAL MEMORY with suitable example.

ii) Discuss following four methods to handle Deadlock
1.) Deadlock Ignorance (Ostrich Method)
2.) Deadlock Prevention
3.) Deadlock avoidance (Banker's Algorithm)
4.) Deadlock detection and recovery

iii) Describe each step in detail to prepare Gang Chat for following processes using SRTF approach:

	AT	BT
P_1	0	5
P_2	1	4
P_3	2	2
P_4	4	1

Given Criterion 'Preemptive'. Symbols have their usual meanings.

iv) Elaborate need of CPU Scheduling and role of Process Control Block (PCB), with its Block diagram.

v) Describe 'Banker's Algorithm. And check DEADLOCK detection and DEADLOCK Avoidance for Following:

	Allocation	*Max*	*Available*
	A B C	*A B C*	*A B C*
T_0	0 1 0	7 5 3	3 3 2
T_1	2 0 0	3 2 2	
T_2	3 0 2	9 0 2	
T_3	2 1 1	2 2 2	
T_4	0 0 2	4 3 3	

vi) Explain following Disk Access Time
(i) Seek Time
(ii) Rotation Time
(iii) Rotational Latency
(iv)Transfer Time

vii) How Semaphores is a unique approach for smooth and hassle-free execution of critical section problem. Discuss with step by step execution of Algorithm.

Section – C
Descriptive Questions

3. Answer any two of the following question. **2x10=20**

i) A disk contains 200 tracks (0-199), request queue contains track number 82, 170, 43, 140, 24, 16, 190 respectively. Current position of read write head is at 50.

(a) Calculate total number of tracks movement by read/write head using LOOK algorithm and compare its working with C-LOOK, which one is batter?

(b) Calculate total number of tracks movement by read/write head using SSTF algorithm and compare its working with FCFS, which one is batter?

(c) If read / write head takes 1.8 ns to move from one track to another, then calculate total number of time taken.

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5x7=35

ii) When does page fault occurs? Explain Page replacement algorithm/strategies for following (Symbols have their usual meanings)

F_3																			
F_2																			
F_1																			

Reference String: 7, 0, 1, 2, 0, 3, 0, 4, 2, 3, 0, 3, 2, 1, 2, 0
Evaluate (i) Page Hit Ratio (ii) Page fault Ratio

Using following page replacement algorithm
(i) FIFO
(ii) Least recently used

iii) A system has:

- Logical address space = **16 KB**
- Page size = **1 KB**
- Page table (partial):

Page No.	Frame No.
0	5
1	9
2	1
3	7
4	3

Find the **physical address** for the logical address: **3456 bytes**

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